

Technology Innovation Project



Project Brief

TIP 25b: EPRI Testing Guidelines and Utility Practices for Multi-Vendor Equipment and Systems Based on IEC 61850 Standard

Context

Next-generation substations will use advanced communication infrastructure and protocols to allow interoperability for multivendor intelligent electronic devices (IEDs) and provide advanced features for protection, control, and automation. The IEC 61850 standard not only enables interoperability by providing a standardized framework for substation components and communications, but also introduces new features, such as station bus and process bus, to innovate current substation practices and reduce project costs.

Description

The IEC 61850 standard is complex and feature-rich. However, one outstanding challenge for the industry is lack of a testing methodology and guideline to assist utility in implementation, testing, and maintenance of IEC 61850-based equipment and systems. The testing methodology and guideline are required not only for the purpose of conformance to the standard but also for those practical and essential applications, which include factory and site acceptance, commissioning, and maintenance testing in a field environment.

This proposed research will apply the following approaches:

- Collaborate extensively with utilities, standards organizations, equipment vendors, and subject matter experts to address project challenges.
- Develop testing guidelines and demonstrate testing concepts and methods by using state-of-the-art multivendor digital relays and communication facilities in an EPRI smart grid substation.
- Document the good practices and field experiences by working closely with member utilities.

Why It Matters

This project can provide substantial new learning in application and deployment of the IEC 61850 standard for next-generation substation development. The work will be in support of National Institute of Standards and Technology (NIST) SGIP (Smart Grid Interoperability Panel) testing and conformance committee activities and contribute to the maturity of the IEC 61850 standard. It will benefit the public in that it provides an important step in achieving the smart grid specified in the 2007 Energy Independence and Security Act. This act clearly described the benefits to society of a smart grid and the application of interoperability standards, such as IEC 61850, which is a key aspect of migrating today's power system infrastructure to a smart grid.

Goals and Objectives

The goal of this project is to research and develop testing guidelines that can be used in the field to assist in function and performance testing for multivendor equipment and systems based on the IEC 61850 standard. The objectives of the project include the following:

- Work with utilities to identify key IEC 61850 testing issues in critical processes, including acceptance tests and field and maintenance tests within substation environment. Perform R&D on key requirements and create use cases based on the most recent release of the standard (Edition 2 or later).
- Develop guidelines, good practices, and testing tools to support field deployment of the IEC 61850 standard.
- Develop an IEC 61850 testbed system in EPRI laboratories to demonstrate the developed methodologies and approaches, and use it as a vehicle for a technology transfer workshop.

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Project Start Date: January 1, 2011

Project End Date: December 31, 2015

Funding

Total Project Cost: \$500,000

BPA Share: \$50,000

External Share: \$450,000

BPA FY2013 Budget: \$50,000

Reports & References (Optional)

Links (Optional)

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Participating Organizations

EPRI
Con Edison
National Grid
Hydro One
NYPA

